

REMARKS

Reconsideration and allowance respectfully are requested in light of the instant amendment.

Applicant has amended Claims 11 and 22 to call more clearly for the present claimed process to comprise two *catalytic cracking* reaction sections – the first section of the riser for selectively cracking a hydrocarbon feedstock to gasoline, and the second section of the riser to selectively crack the gasoline produced in the first riser section to olefins, namely, propylene and butylenes. Applicant respectfully submits that no new matter has been added.

In the first part of the Office Action, the Examiner objected to the disclosure as containing informalities in Claims 17 and 21. In response, Applicant has amended the temperature range in Claim 17 to limit further the temperature limitation of Claim 11(support for this amendment can be found at page 7, line 8) and to correct the word “removed” to recite “remove” in Claim 21, as suggested by the Examiner. Applicant respectfully submits that no new matter has been added.

In the second part of the Office Action, the Examiner rejected Claims 11-22 under 35 U.S.C. § 103(a) as being unpatentably obvious over Xu et al. (EP 1 046 696 (“Xu ‘696”)). According to the Examiner, the Xu ‘696 reference discloses a process of (i) cracking hydrocarbons in a first reaction zone in the presence of steam and a catalyst at a specified

temperature range and catalyst to feed weight ratio; (ii) passing the product from the first reaction zone to a second reaction zone at temperatures lower than those called for by the current claims; (iii) separating spent catalyst from the catalyst and recycling stripped and regenerated catalyst to the reactors; and (iv) producing a gasoline fraction and olefins.

Applicant respectfully traverses the rejection for at least the following reasons. The Xu '696 reference cannot render the present claimed invention obvious because the Xu '696 reference teaches away from the present invention. The present invention claims a process for producing olefins, namely propylene and butylenes, while the Xu '696 reference teaches a process for producing gasoline with increased amounts of isobutene and isoparaffins to improve the octane of the gasoline. Because the object of the Xu '696 reference is to produce gasoline (albeit with increased amounts of isobutene and isoparaffins), the Xu '696 reference necessarily teaches away from the present invention, which calls for a process not to produce gasoline, but to produce lower olefins at the expense of gasoline. In order for the present claimed process to produce such lower olefins, the present claimed process specifically calls for cracking the desired product of Xu '696 (gasoline) in order to crack the gasoline into lower olefins. Thus, because the process of the present claimed invention actually teaches destroying the desired product of the applied reference, the applied reference teaches away from the present claimed invention and, accordingly, cannot render the present claimed invention obvious.

Applicant respectfully directs the Examiner's attention to the teaching of the Xu '696 reference that the second reaction zone serves as a reaction environment for the *isomerization* of the gasoline product produced in the first reaction zone. *Isomerization* by definition does not crack the gasoline product; isomerization merely effects an isomerization of normal paraffins and

normal olefins to isoparaffins and isoolefins, respectively. According to the Xu '696 reference: "the preheated feedstock is contacted with hot regenerated catalyst in the lower part of a reactor with the result that catalytic cracking reaction takes place, and the mixtures of vapors and the coke deposited catalyst are up-flowed and enter into a suitable reaction environment with the result that *isomerization and hydrogen transfer* take place." *See Abstract* (emphasis added). For this reason, isomerization as opposed to cracking of the gasoline, the Xu '696 reference provides that the "suitable reaction environment" in the second reaction section be conducted at a reaction temperature lower than the temperature required for a cracking reaction. *See Xu reference Tables 3, 5, 6, 8, 9 and 11.* To crack the gasoline to lower olefins as called for in the present claims would be contrary to the purpose of Xu '696.

Thus, in marked contrast to Xu '696, the present claimed process specifically requires the second riser cracking section (4) to comprise a *catalytic cracking* section for selectively cracking the gasoline produced in the first riser section to olefins as product. Because the function of the second riser section of the present claimed process is cracking *and not* isomerization, the higher temperatures necessary for cracking the gasoline to olefins are employed and claimed herein. In this regard, Applicant further notes that the Xu '696 reference teaches employing a quench 6 between the first reaction zone and second reaction zone. While this makes sense in the context of Xu '696, which requires a temperature below which any cracking would take place in the second reaction zone in order to **not** crack the desired gasoline product, such teaching reinforces the disparate teaching of Xu '696 from the present claimed invention, which seeks to maintain high temperatures in the second reaction zone in order to crack the gasoline to olefins.

Xu '696 also is distinguishable from the present claimed invention for the reasons noted by the Examiner. For example, the Xu '696 reference does not disclose the hourly space velocities of the first and second reaction zones. In light of the differences in the process objectives discussed above, Applicant respectfully submits that Xu '696 would not have taught or suggested the present claimed space velocities. Isomerization of normal paraffins and butene to isoparaffins and isobutene, respectively, takes place under completely different reaction parameters than cracking gasoline (including the normal paraffins) to lower olefins.

Also, contrary to the Examiner's comments, Applicant respectfully submits that it would not have been obvious to one skilled in the art to only partially convert the hydrocarbon feedstock to gasoline in the first cracking zone, such as called for in Claim 15 herein. The purpose of Xu '696 is to convert the feed to as much gasoline as possible, if the conversion is not effected in the first reaction zone, the feed will not be converted to gasoline in the second reaction section because no cracking takes place in the section isomerization section, thus rendering the Xu '696 process ineffective for accomplishing its stated objective. In contrast, the present invention is not concerned with producing gasoline, but with lower olefins, especially propene and butenes as opposed to ethylene. Applicant surprisingly has found that by first only partially converting the feed to gasoline and then further cracking the intermediate product (gasoline) at high temperatures and lower space velocities, a process is provided that produces more propylene and butenes and less ethylene, whereas if only one reaction zone is employed, more ethylene is produced due to overcracking of the butenes and propylene.

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In light of the foregoing, Applicant respectfully submits that the obviousness rejection over Xu '696 is overcome and the claims are in condition for allowance. Early and favorable action is earnestly solicited. The Examiner is invited to contact the undersigned to discuss any still outstanding matters.

Respectfully submitted,



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